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ABSTRACT

The relationship between instructional treatment manifested as mastery learning and non-mastery learning strategies and various measures of Spanish proficiency was studied with 41 freshmen at an all-female high school in the New Orleans (Louisiana) area. Subjects were grouped homogeneously into 2 classes of 22 and 19 students, representing the experimental group that received mastery learning instruction and the control group that received conventional/non-mastery learning instruction, respectively. Dependent variables of degree of learning as indexed by achievement scores, perseverance on assigned academic tasks, and time required to criterion were examined in the context of a non-equivalent, matched control group, pretest-posttest design. Analysis of covariance and correlated groups t-tests suggest significant achievement scores and time invested favoring the mastery approach, but non-significant differences regarding perseverance. The provision of feedback-correction procedures via diagnostic formative trial tests and the learning corrective prescriptions appears to be a key element in the effectiveness of mastery learning as an instructional delivery system. Five tables present study data. (SLD)

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The Effect of Mastery Learning Instruction on the Entry-Level Spanish Proficiency of Secondary School Students

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Abstract

This study investigated the relationship between (a) instructional treatment manifested via mastery and non-mastery learning strategies and (b) various measures of Spanish proficiency among 41 female high school freshmen. Dependent variables of degree of learning as indexed by achievement scores, perseverance on assigned academic tasks, and time required to criterion were examined in the context of a nonequivalent, matched control-group, pretest-posttest design. ANCOVA and correlated groups *t* tests suggested significant achievement scores and time invested favoring the mastery approach but nonsignificant differences regarding perseverance.

The Effect of Mastery Learning Instruction on the Entry-Level Spanish Proficiency of Secondary School Students

The dominant trend in foreign language teaching is toward greater concentration on developing communicative proficiency skills. The adoption of this goal in the foreign language curriculum requires, in addition to modification of syllabus-design practices, a revision of classroom practices and the teaching environment.

Benjamin S. Bloom (1968) and his associates successfully developed strategies for learning for mastery as an approach for improving the quality of school learning. Bloom's practices derive from Carroll's (1963) model of school learning. At the heart of this model is Carroll's premise--based on his studies of individual differences in second language learning--that scores on aptitude measures reflect differences in the amount of time needed for learning rather than differences in the amount that can be learned. In brief, the model states that learners will succeed in learning a given task to the extent that they receive proper instruction and that they spend the amount of time on task that they individually need to learn.

Carroll's model can be used to determine the reasons for a student's success or failure in school. The model consists of five factors: three learner-oriented variables (i.e.,

aptitude, ability to understand instruction, and perseverance) and two instruction-oriented variables (i.e., quality of instruction and opportunity for learning) that are purported to account, directly or indirectly, for the amount of school learning that takes place.

Mastery learning begins with the notion that most students can attain a high level of learning capability if their knowledge level is accurately diagnosed, if the material and practices are suitable and systematically presented, if the students are helped when and where they have learning difficulties, and if provided with a clear criterion of what constitutes mastery. Variations in learning and the level in learning are determined by the student's learning history and the quality of instruction received (Bloom, 1974).

Mastery learning ideas and practices can be integrated with second language contemporary trends in fostering learning for competence. Since language is a skill requiring continuous sequence of learning as well as a control of prerequisites, it lends itself to programs of mastery learning.

Essential for mastery learning is the developing of a hierarchical learning sequence divided into units, successively identifying levels of mastery, diagnosing the problems encountered, and requiring students to master each unit before beginnning subsequent units. In the same way, the study of a foreign language can be broken down fairly neatly into learning units

that have elements and parts that form a separable whole sufficient for learning the subject and that fit well into the entire course or curriculum.

Foreign language learners assign a high value to achievement of even a minimum level of ability in the use of the foreign language, though they would scarcely have the opportunity to engage in authentic speech acts. By granting minimal achievement in the language a high priority in the early stages of instruction, students might be induced to persevere, and in this way attain greater overall proficiency and knowledge than if oral practice were deferred to a more advanced level.

By utilizing the Carroll model of school learning as a framework for implementing a mastery learning strategy in teaching Spanish, this study attempted to provide insight concerning the degree to which learning outcomes in the Spanish language were influenced by the teaching strategies used, the student's ability to understand instruction and aptitude, all relative to the degree of learning attained, the amount of perseverance manifested by the students, and the time required to attain a criterion level of achievement.

More specifically, the purpose of this study was to address the following research questions:

1. With the effects due to foreign language aptitude, ability to understand instruction, and previous Spanish language

knowledge controlled statistically, will there be a significant difference between an experimental group taught by way of mastery learning and a control group instructed via conventional/non-mastery methods relative to degree of learning measured by entry-level Spanish achievement among high school students?

2. With the effects due to aptitude and ability to understand instruction controlled statistically, will there be a significant difference between a mastery-taught experimental group and a non-mastery-taught control group relative to perseverance on an academic task?

3. Within the mastery learning group, will there be a significant difference between the first nine-week unit #1 and the second nine-week unit #2 relative to the number of remedial sessions required to reach criterion?

Based on the accumulated theoretical and empirical literature in mastery learning--particularly, for example, Bloom (1968, 1976) and Carroll (1963)--the following research hypotheses were investigated in this study:

Research hypothesis 1. With statistical adjustments made for differences in foreign language aptitude, ability to understand instruction, and previous Spanish language knowledge, there will be a significant difference between an experimental group taught by way of mastery learning and a control group instructed via conventional/non-mastery methods relative to degree of learning measured by entry-level Spanish achievement among high school

freshmen. Furthermore, the direction of the difference will favor the mastery-taught group.

Research hypothesis 2. With statistical adjustments made for differences in aptitude and ability to understand instruction, there will be a significant difference between a mastery-taught experimental group and a non-mastery-taught control group relative to perseverance on an academic task. More specifically, with adjustments made for differences in aptitude and ability to understand instruction, the mastery-taught group will manifest a greater number of completed homework assignments than will the non-mastery-taught group.

Research hypothesis 3. Within the mastery learning group, there will be a significant difference between the first nine-week unit #1 and the second nine-week unit #2 relative to the number of remedial sessions required to reach criterion. More specifically, given prior achievement levels of mastery for unit #1, students will need fewer remedial sessions to attain criterion in unit #2.

Method

Subjects

The sample used in this study involved a total of 41 ninth-graders with no prior experience in learning Spanish as a second language. These subjects were enrolled in an all-female high school in the New Orleans area for the 1989-90 academic year and were grouped homogeneously into two classes of 22 and 19 students. The grouping was based on the results of the STS High School Placement Test completed in the spring 1989 semester. The tracking pattern of school organization under which these students were classified resulted in the sample of 41 subjects being restricted to the lower freshman class track. These two freshman Spanish classes were then assigned to the same teacher-researcher (LTO) for the duration of the academic year. The sizes of the experimental group (n = 22) and the control group (n = 19) remained constant throughout the conduct of the study.

Instrumentation

The Scholastic Testing Service High School Placement Test was administered in early spring 1989 and used as a basis for the homogeneous tracking of students as well as a measure of Carroll's (1963)

ability to understand instruction variable.

The Modern Language Aptitude Test--Long Form A (Carroll & Sapon, 1958) was used to assess Carroll's variable of aptitude specific to any foreign language. This version of the instrument is appropriate for grades 9 - 16 and shows reliability and predictive validity coefficients of .90 and .71, respectively (Cronbach, 1971).

The National Spanish Examinations--Level I (American Association of Teachers of Spanish & Portuguese (AATSP), 1988) was used, along with end-of-term/unit summative tests at the conclusion of the first and second nine-week grading periods, to measure achievement in Spanish as a second language. Content validity is assured by the AATSP; test reliability is .84.

For the purpose of obtaining data thought to be representative of the variable identified by Carroll as perseverance, the number of completed homework assignments turned in was used. The measure used to quantify the time needed by students in the experimental group to achieve mastery included the number of remediation trials required by each student

who did not achieve the mastery level after regular instruction on the original lesson.

Procedures

Given the presence of a manipulated independent variable and the absence of random assignment of subjects to treatment, this study entailed a difference-oriented, between-subjects, quasi-experimental design. More specifically, the design used was a nonequivalent, control-group, pretest-posttest design involving two intact groups matched primarily on the basis of ability to understand instruction as measured by the STS High School Placement Test.

The manipulated independent variable was that of instructional treatment having two levels: (a) an experimental group that received mastery learning instruction and (b) a control group that received conventional/non-mastery learning instruction.

The subjects in this study participated in the same curriculum upon which the two levels of instructional treatment were based. Specifically, an Introductory Program of Spanish as a Second Language (IPSSL) containing in part two sequential nine-week units of 10 and 12 semantic topics, respectively, was

offered to help students attain an acceptable degree of proficiency in the four language skills of understanding, speaking, reading, and writing. All participants in the IPSSL used Valette and Valette's (1984) Spanish for Mastery I with supplemental audiotapes, filmstrips, and workbook.

The following five instructional features were also common to both the experimental and control groups: a statement of performance objectives that apprised students of those particular learning tasks for which they would be responsible; a description of the learning activities that informed students of those specific strategies to which they would be exposed and for which they would be held accountable; a specification of assignments for class and out of class that corresponded to the performances objectives and represented activities required of each student; announcements of dates when summative posttests must be completed for the purpose of demonstrating the level of achievement attained; and the provision of answer keys not contained in the textbook.

The experimental group used instructional units containing the following two elements considered crucial to the operational definition of a mastery

learning instructional strategy: (a) diagnostic, formative trial tests to provide both student and teacher with on-going feedback relative to learning deficiencies experienced by students as well as modifications most needed in the instructional materials and/or strategies; and (b) the prescription of learning correctives of a review/remedial nature to which students would be recycled after their initial unsuccessful attempt at attaining the criterion score. The focus of these learning correctives was on additional assignments as well as a tutoring session after regular class time during which the teacher attempted to provide needed personalized assistance reflective of the formative trial test results. These diagnostic-prescriptive features of the mastery learning level of instrucitonal treatment were beyond what students in this group would have gotten if the study had not been conducted.

The control group was required to attend regular classes, to complete all assignments, and to take the end-of-unit summative test. This was accomplished in the context of the five instructional features identified earlier as common to both levels of the independent variable. The principal distinction

between the two groups was that the control group did not participate in the diagnostic formative trial tests nor the accompanying prescription of learning correctives--the two defining aspects of mastery instruction. In effect, subjects in the control group received the same instructional materials and strategies they would have received were the study not conducted.

Three dependent variables were investigated in this study: (a) degree of learning as indexed by achievement scores, (b) perseverance on assigned academic tasks, and (c) time required by students to achieve the mastery criterion score on formative tests.

Degree of learning was assessed by three measures: an instructor-developed, unit-specific summative achievement test at the conclusion of each of the two nine-week instructional units addressed in this study; and the National Spanish Examination used as a posttest at the conclusion of the study.

Perseverance was measured by the number of completed homework assignments submitted on time and as specified. For the duration of this study an accurate account was maintained of the total number of homework assignments completed by students in both groups. The

resulting data on this dependent variable is admittedly only an approximation of the factor identified by Carroll as perseverance.

The third dependent variable, time required, was assessed by an account of the total number of times students in the mastery learning group were cycled to learning corrective sessions--both in and out of class--as a function of not initially achieving mastery on a formative test.

Extraneous variables in this study that had the potential to function as confounds yet were addressed in an attempt at control included the following: (a) student ability to understand instruction, i.e., general ability; (b) student aptitude for foreign languages; and (c) students' previous Spanish language knowledge.

Specifically, ability to understand instruction was measured by the STS High School Placement Test and used as a basis for the homogeneous grouping of the study's subjects into two matched intact groups that were part of the lower freshman class track. Furthermore, this measure of general ability was later used in the data analysis as a factor of statistical control via ANCOVA. Likewise, foreign language

aptitude and previous Spanish language knowledge were also subsequently used as covariates in ANCOVA.

Results

Degree of learning as a dependent variable was manifested in three measures: (a) unit #1 summative posttest achievement scores, (b) unit #2 summative posttest achievement scores, and (c) National Spanish Examination posttest achievement scores.

As displayed in Table 1, a one-way analysis of covariance compared the unit #1 summative posttest achievement scores for the experimental group ($\underline{M}$ = 79.30) and the control group ($\underline{M}$ = 72.43), with effects due to aptitude, ability to understand instruciton, and previous Spanish language knowledge held constant. This was found to be statistically significant, $\underline{F}(1,36) = 4.35$, $\underline{p} < .05$, thus confirming research hypothesis 1 that favored the mastery learning group on this first measure of degree of learning.

Insert Table 1 about here

Likewise, a similar ANCOVA was conducted on the unit #2 summative posttest achievement scores for the experimental group ($\underline{M}$ = 82.45) and the control group ($\underline{M}$

= 74.06). As shown in Table 2, this was found to be statistically significant, $F(1,36) = 9.72$, $p < .05$, thereby confirming research hypothesis 1 that favored the experimental group on this second index of degree of learning.

Insert Table 2 about here

The third measure of degree of learning as a dependent variable--National Spanish Examination posttest achievement scores--also confirmed research hypothesis 1's prediction favoring the mastery learning group. The one-way ANCOVA performed here compared the experimental group's performance ($M = 35.05$) with that of the control group ($M = 30.73$) and found the difference to be statistically significant, $F(1,36) = 13.88$, $p < .05$. (See Table 3.)

Insert Table 3 about here

Perseverance as a dependent variable was indexed by the total number of homework assignments completed on time and as specified. As presented in Table 4, a one-way ANCOVA compared the mean number of completed

homework assignments for the experimental group (M = 56.19) against that of the control group (M = 54.73), with effects due to aptitude and ability to understand instruction held constant. This was found to be statistically nonsignificant, $F(1,37) = 2.93$, $p > .05$, thus failing to confirm research hypothesis 2 that favored the mastery learning group.

Insert Table 4 about here

Time required, the third dependent variable, was measured by the total number of times that students in the mastery learning group needed to complete learning corrective sessions as a result of not initially achieving mastery on a formative test. As indicated by Table 5, a correlated groups t test compared the mean number of remedial sessions required to reach criterion in unit #1 (M = 5.91) against the mean number of sessions needed in unit #2 (M = 7.55). This test was found to be statistically significant, $t(21) = -2.24$, $p < .05$; however, the direction of the difference was the opposite of that predicted in research hypothesis 3 in that unit #2 was expected to result in fewer--not more--remediation sessions than occurred in unit #1.

Insert Table 5 about here

Discussion

Significant results were consistently found at the .05 level favoring the mastery-taught group over the non-mastery-taught group relative to the three categories that represented degree of learning; namely, posttest achievement scores emanating from the unit #1 posttest, unit #2 posttest, and the National Spanish Examination posttest. Thé provision of feedback-correction procedures via diagnostic formative trial tests and the learning corrective prescriptions appears to be a key element in the effectiveness of mastery learning as an instructional delivery system. the importance of this instructional component can be attributed largely to the more focused identification of en-route obstacles to learning as well as the increase in opportunities for learning. These results are consistent with the findings of reviews reported by Block and Burns (1976), Bloom (1976), Brophy (1979, 1982), Burns (1979, 1986), and Guskey and Gates (1986).

Significant findings were not uncovered regarding perseverance as a dependent variable. This factor, measured by number of homework assignments completed on time and as specified, was admittedly a rough approximation of the perseverance variable included by Carroll (1963) in his model of school learning. It appears that the various components of the mastery learning strategy used in this study were not more effective in ensuring that students would be more willing to spend time to complete a given foreign language assignment. Of course, the difficulty encountered in defining and measuring this variable may contribute to its elusiveness as a factor that can be demonstrably enhanced by mastery learning techniques.

With respect to time needed, under mastery learning conditions students were able to increase their degree of learning; however, this increased achievement appears to require the continual provision of remedial time to slower students. These results are consistent with findings by Arlin (1984a, 1984b) and Horton (1979) who contend that the positive gains in mastery learning programs come mainly from continually providing greater amounts of learning time for students who are experiencing difficulties.

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Table 1

Analysis of Covariance of Experimental and Control Students' Achievement Performance in Unit #1

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Main Effect	350.64	1	350.64	4.35*
Covariates	192.72	3	64.24	
Within (error)	2903.03	36	80.64	
Total	3446.39	40	86.16	

*p<.05

Mean and Adjusted Mean Criterion Scores

	Criterion			
	Post Achievement Obtained			Adjusted
	N	M	S.D.	M
Experimental Group	22	79.23	8.94	79.30
Control Group	19	72.53	8.52	72.43

Table 2

Analysis of Covariance of Experimental and Control Students' Achievement Performance in Unit #2

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Main Effect	522.63	1	522.63	9.27*
Covariates	22.70	3	7.57	
Within (error)	1934.78	36	53.74	
Total	2480.10	40	62.00	

*p<.05

Mean and Adjusted Mean Criterion Scores

	Criterion			
	Post Achievement Obtained			Adjusted
	N	M	S.D.	M
Experimental Group	22	81.14	7.38	82.45
Control Group	19	75.57	7.54	74.08

Tabel 3

Analysis of Covariance of Experimental and Control Students' Achievement Performance on National Spanish Examination

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Main Effect	296.67	1	296.67	13.88*
Covariates	20.31	3	6.77	
Within (error)	769.41	36	21.37	
Total	1086.39	40	27.16	

*p<.05

Mean and Adjusted Mean Criterion Scores

	Criterion			
	Post Achievement Obtained			Adjusted
	N	M	S.D.	M
Experimental Group	22	35.41	4.34	35.05
Control Group	18	30.47	4.85	30.73

Table 4

Analysis of Covariance of Experimental and Control Students' Amount of Perseverance

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Main Effect	17.87	1	17.87	2.93
Covariates	8.53	2	4.27	
Within (error)	225.84	37	6.10	
Total	252.24	40	6.31	

Mean and Adjusted Mean Criterion Scores

	Criterion			
	Post Achievement Obtained			Adjusted
	N	M	S.D.	M
Experimental Group	22	56.10	2.61	56.19
Control Group	19	54.84	2.26	54.73

Table 5

Correlated Groups t Test for Remedial Time Required for Unit #1 and Unit #2 for the Mastery Learning Group

Variables	Means	S.D.'s	df	t
Unit 1 Remedial Time Required	5.81	4.02	21	-2.24*
Unit 2 Remedial Time Required	7.55	4.78	21	

*$p < .05$